Introducing a Web-based System for Hyperspectral Instrument Status and Data Quality Assessment to Meteorological Users

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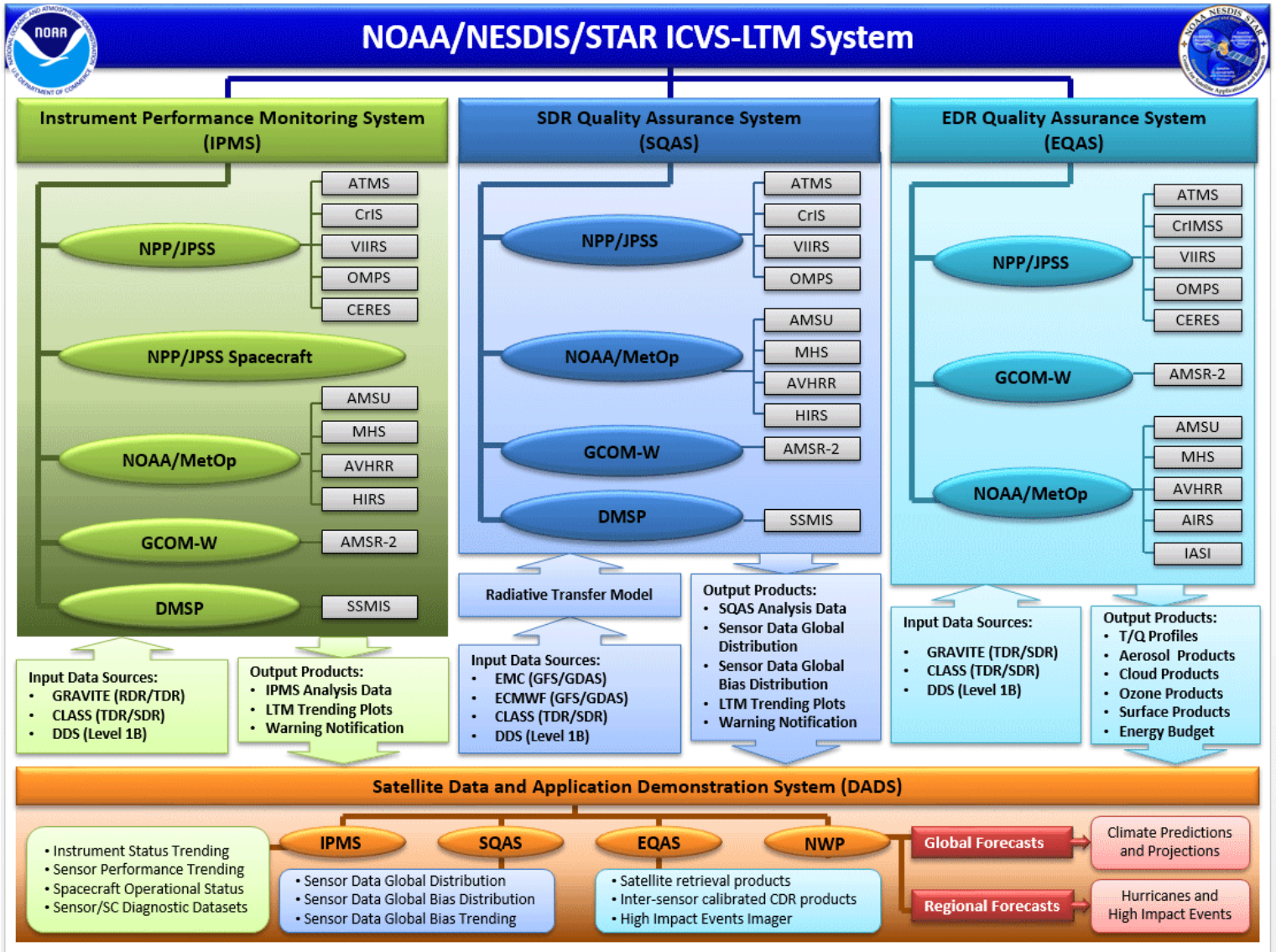
Outlines

1. An introduction to the NOAA Integrated Cal/Val System (ICVS)
    1. ICVS overview
    2. SNPP CrIS
    3. ICVS-CrIS

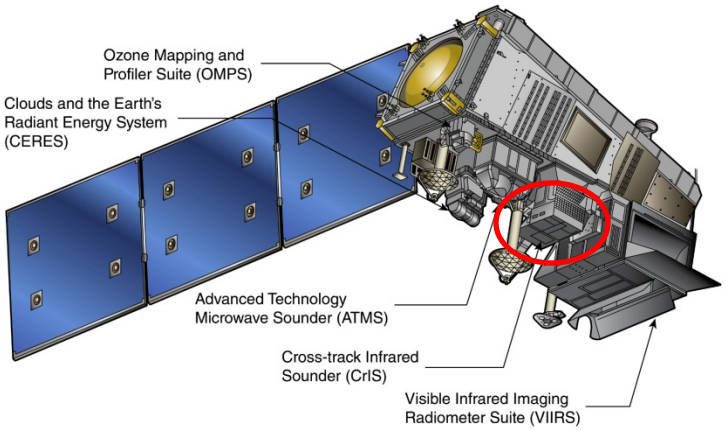
2. Application of ICVS-CrIS in support of NOAA operations
    1. Impulse noise
    2. Lunar intrusion
    3. Ground system performance
    4. Data indexing and querying
    5. Spacecraft maneuver

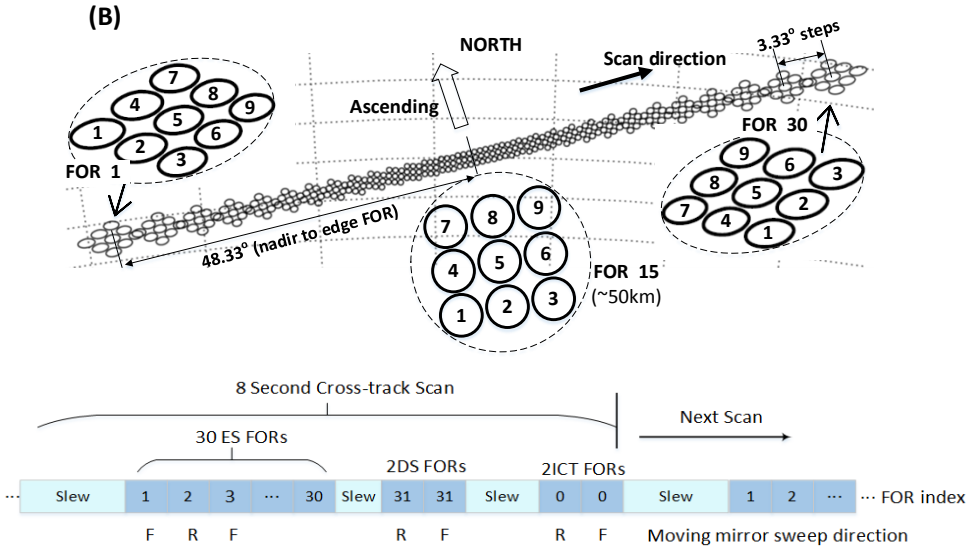
3. Conclusions and future plans

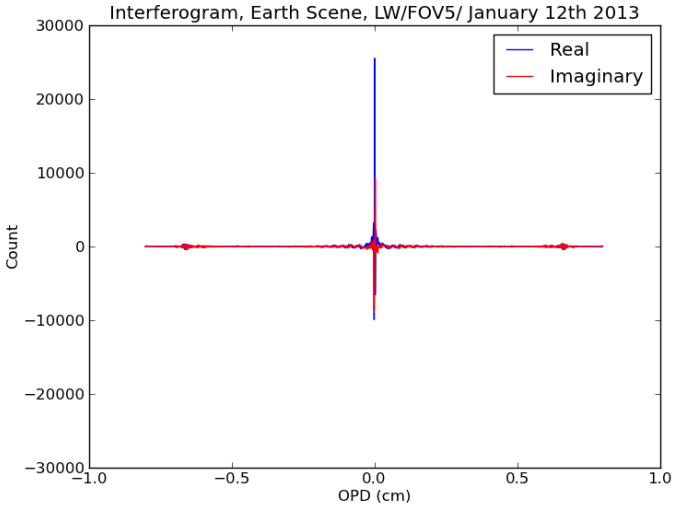
NOAA Integrated Cal/Val System (ICVS)



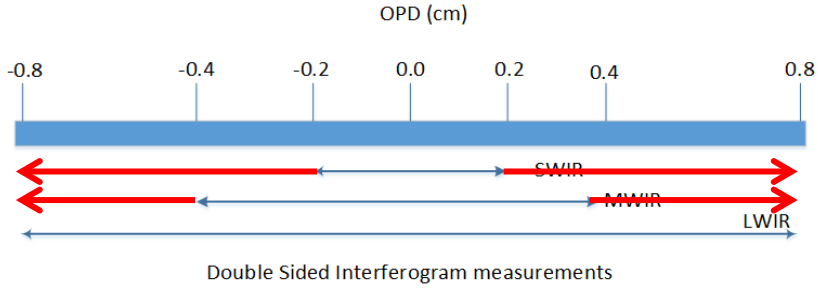
SNPP Cross-track Infrared Sounder (CrIS)
the first NOAA operational hyperspectral infrared sounder







Frequency Band	Spectral range (um)	Effective OPD (cm)	Spectral resolution (wavenumber)	Number of bins in the interferogram
LWIR	9.14 - 15.38	0.80352	0.625	866
MWIR	5.71 - 8.26	0.4092 (0.81375)	1.25 (0.625)	530 (1052)
SWIR	3.92 - 4.64	0.2015 (0.8029775)	2.5 (0.625)	202 (799)

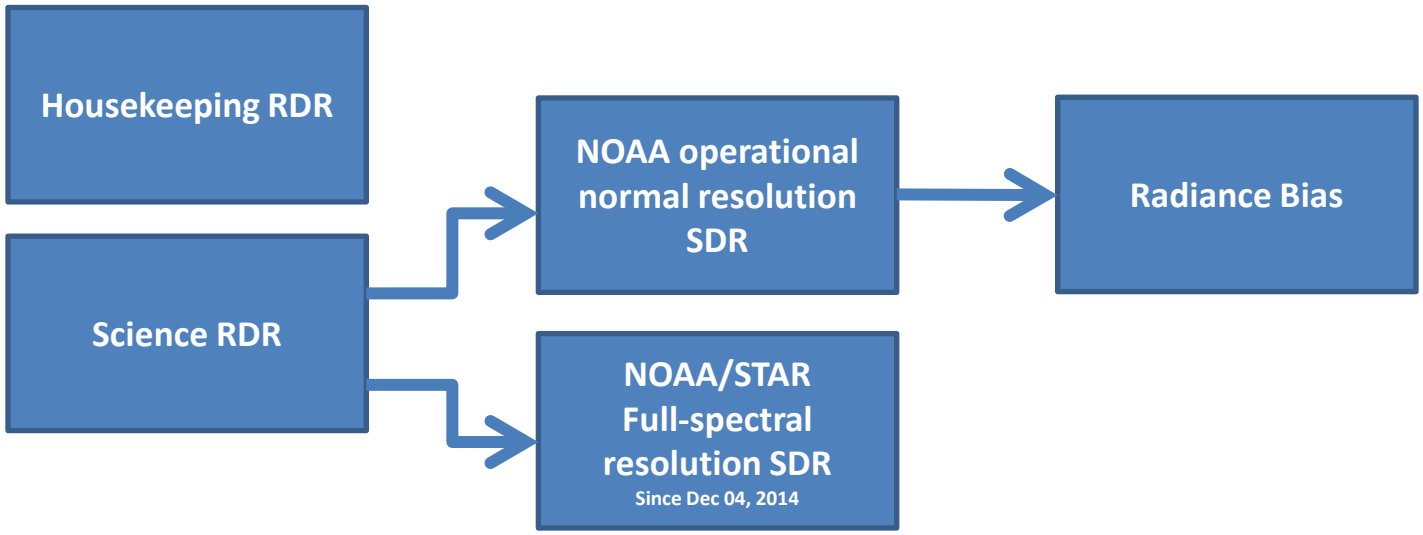


Double Sided Interferogram measurements

Interferograms per day: 9,914,400=3(bands)*9(FOVs)*34(FORs)*10800(scans)

ICVS-CrIS

- Five related modules

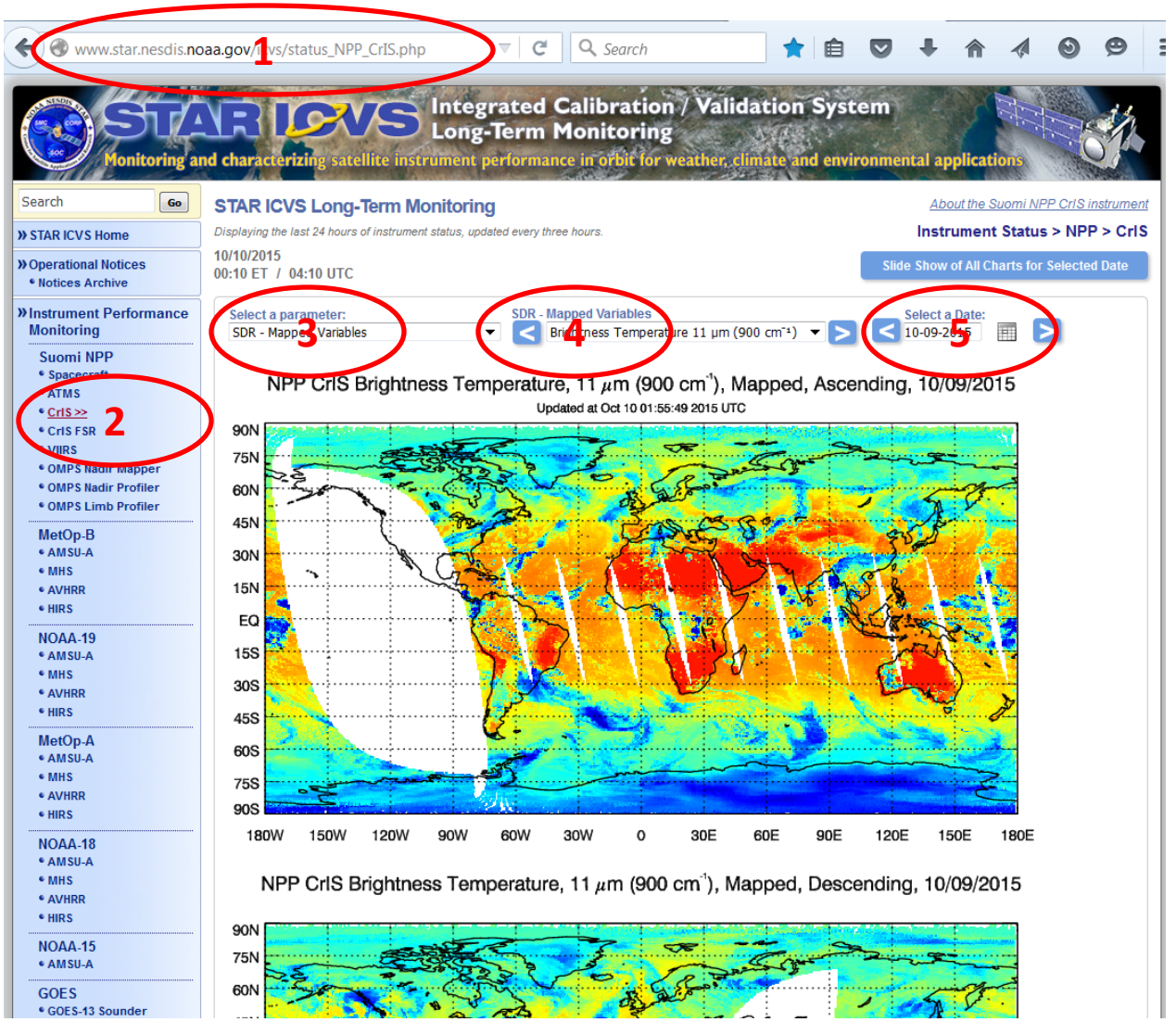


- Full-stack coverage of SNPP CrIS Cal/Val history, ongoing instrument status, and ground system anomalies
  - Intact records of figures and processing logs since the beginning of the mission
  - All the data on the plots are saved for further analysis
  - Anomaly events are archived as JSON files.

- Supporting both SNPP and JPSS-1 CrIS missions

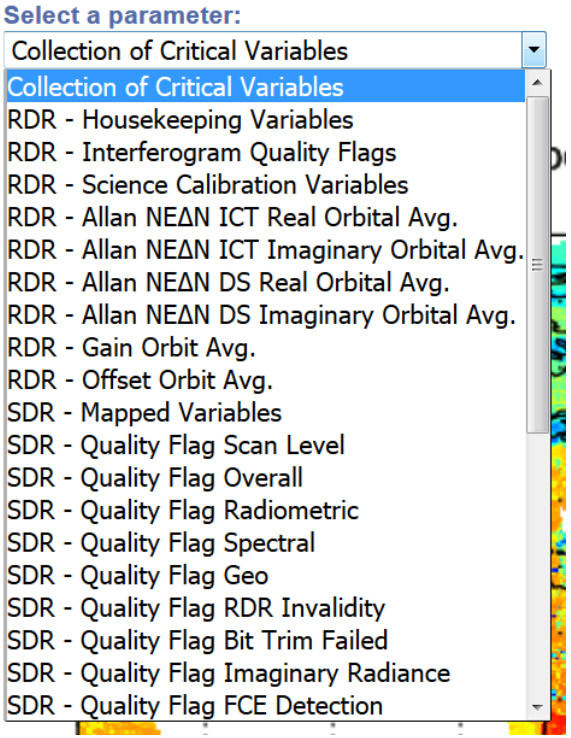
ICVS-CrIS (continued)

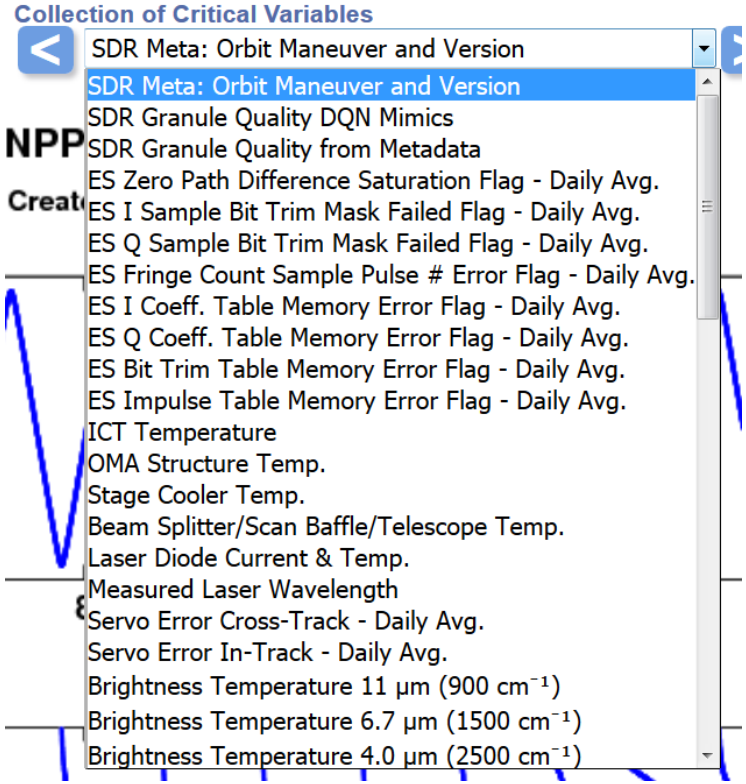
1) Go to www.star.nesdis.noaa.gov/icvs/status_NPP_CrIS.php, or **Google 'noaa icvs'**
2) Select 'CrIS' or 'CrIS FSR' from the left navigation panel
3) Select a group of parameters from the firs draw-down box
4) Select a parameter from the middle drawdown box
5) Select the date from the calender



ICVS-CrIS (continued)

- A closer look

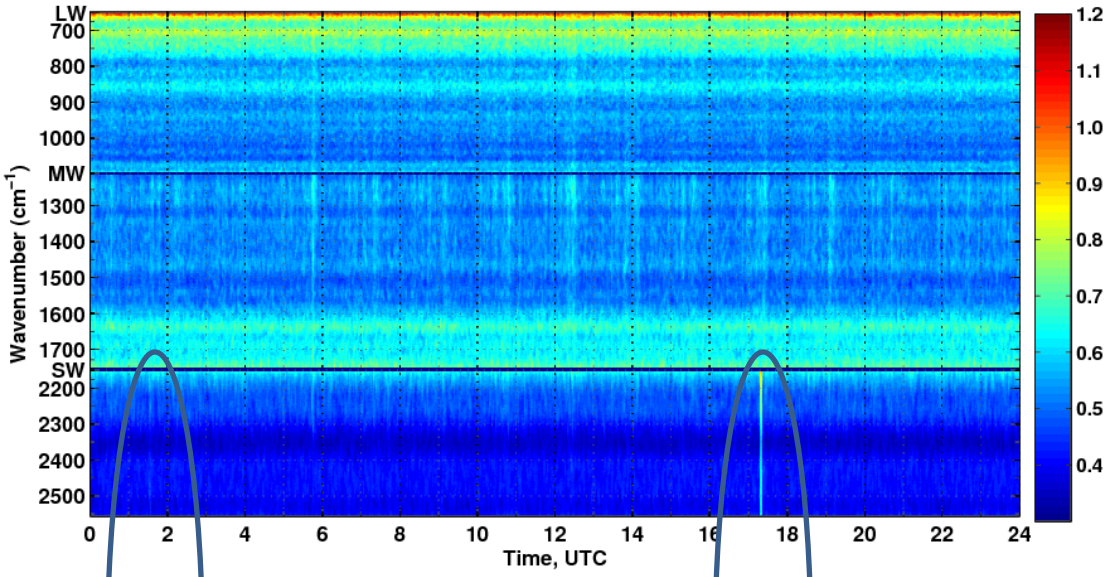




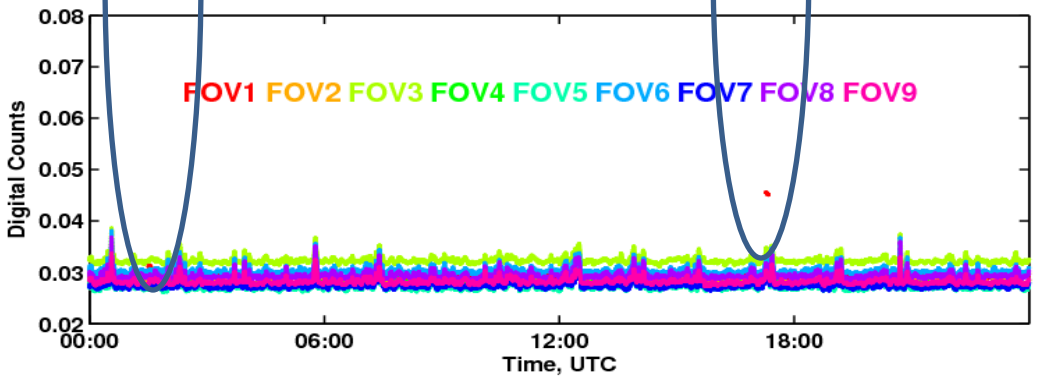
1. Figures in 'Collection of Critical Variables' can be found in other groups. They are my most frequently examined parameters on a daily basis
2. Instrument linearity features are calculated using Allan variance for each orbit
3. 'SDR – Quality Flag ***' include quality flag of each pixel, together with daily averaged statistics

Application: impulse noise

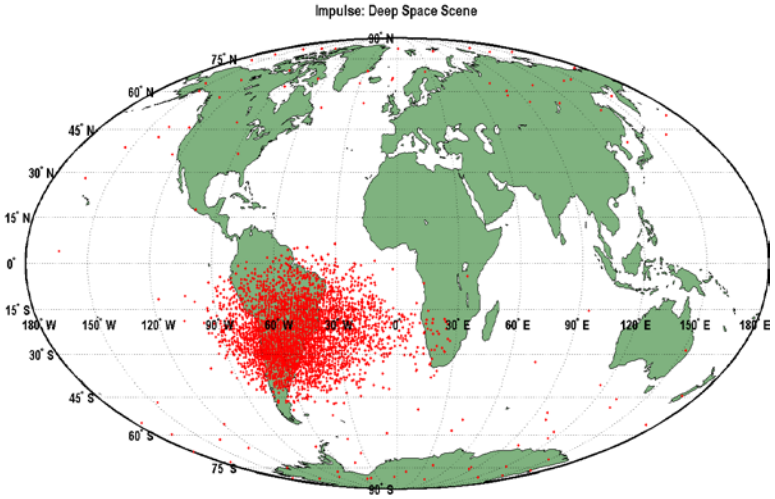
Normalized FOV1 NEDN, Reverse direction, Oct-06-2015

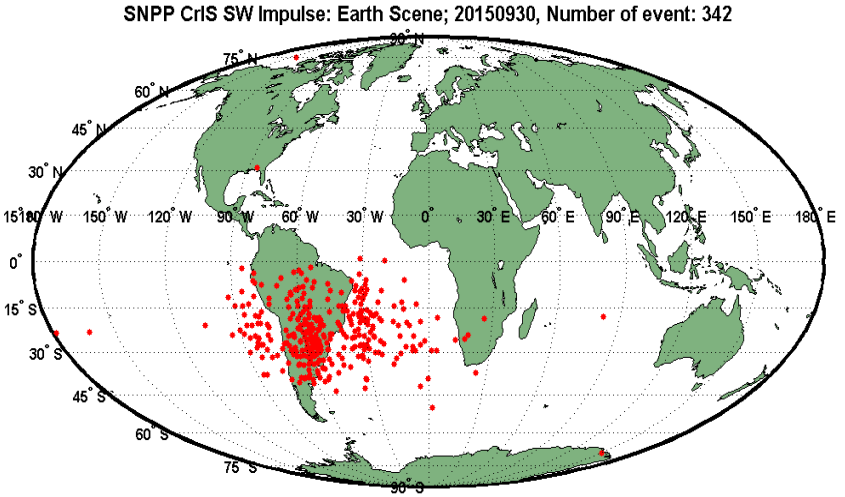


SW Internal Calibration Target Spectral Stability, Oct-06-2015

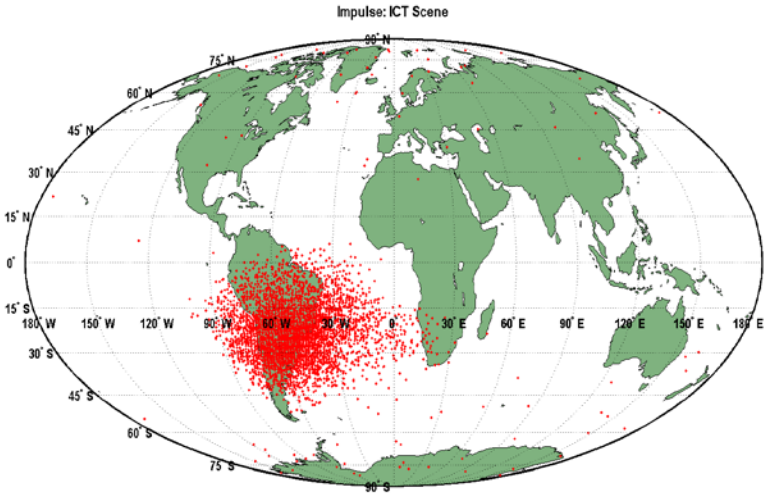


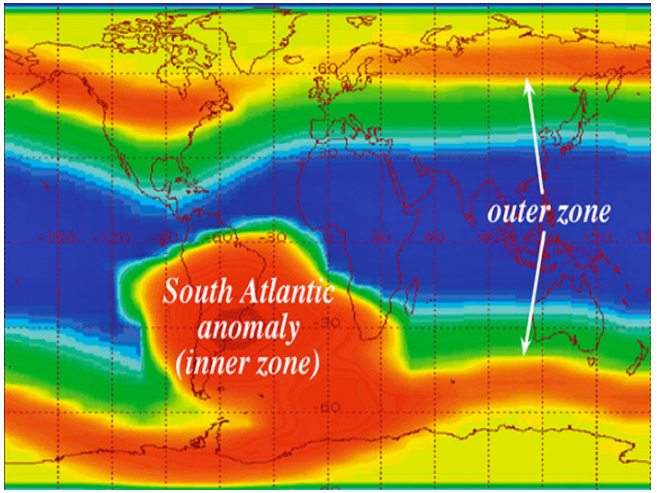
Application: impulse noise





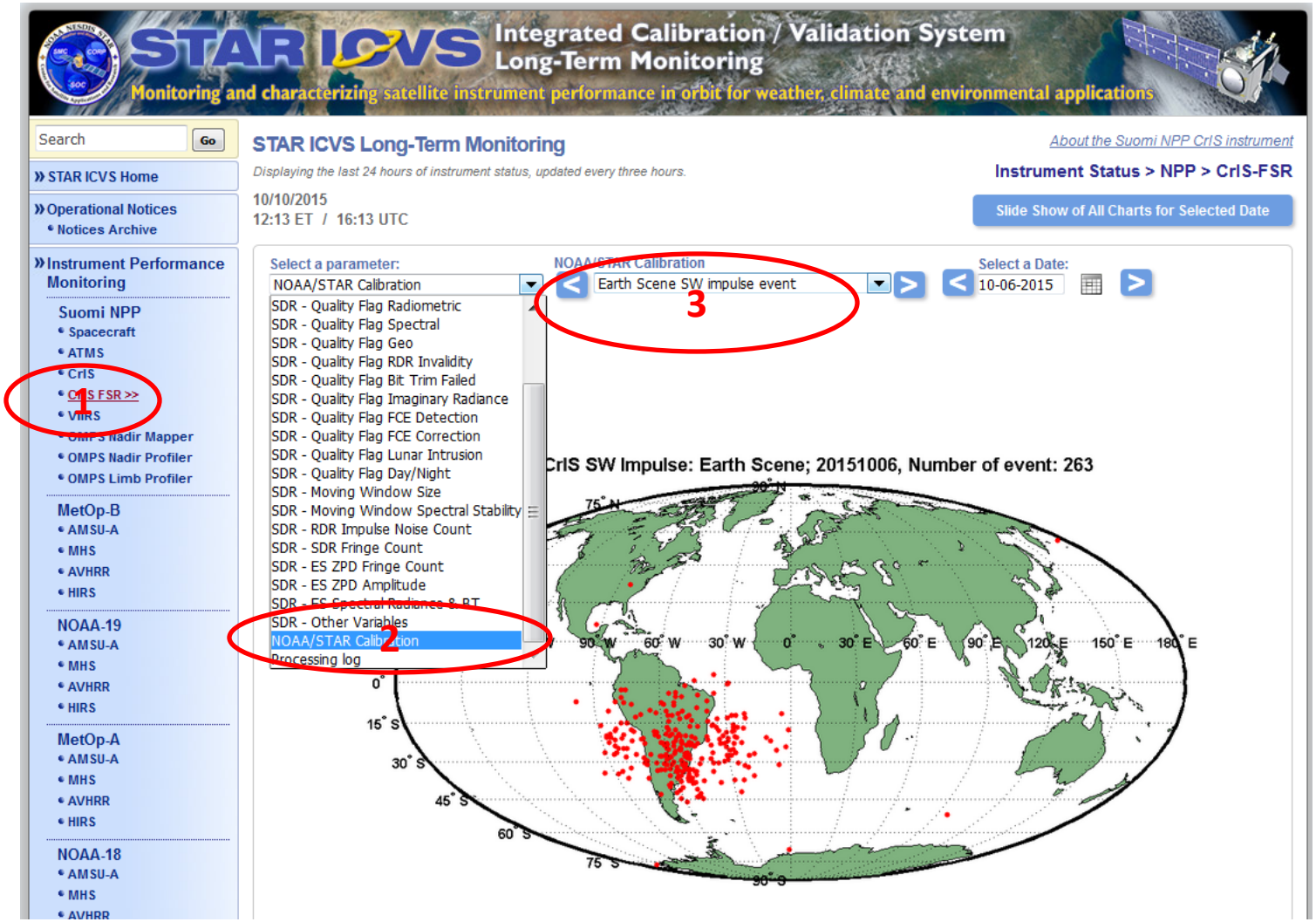
Impulse events on (upper) Cold and (lower) hot calibration targets between Jan 01 and May 31, 2015



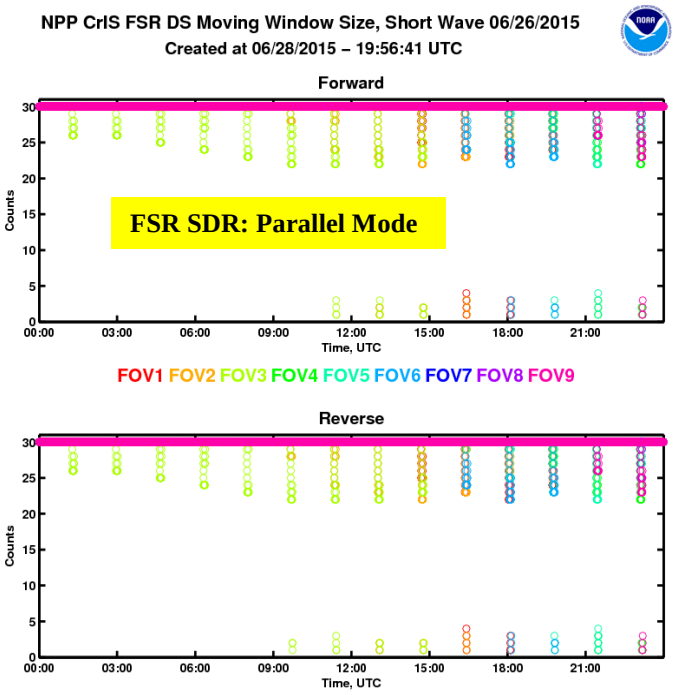


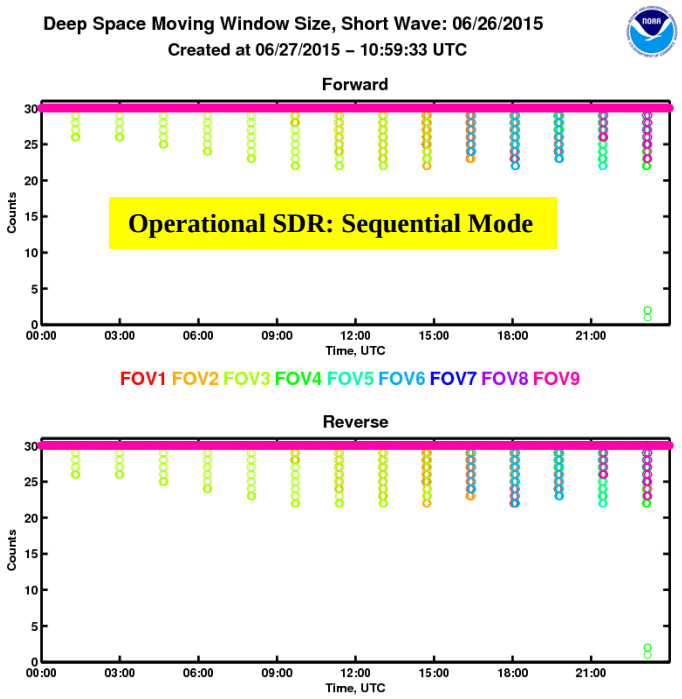
http://www.bibliotecapleyades.net/ciencia/ciencia_earthchanges49.htm

Application: impulse noise

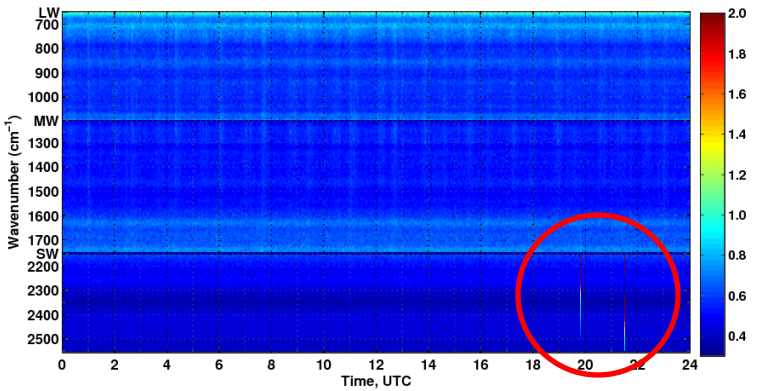


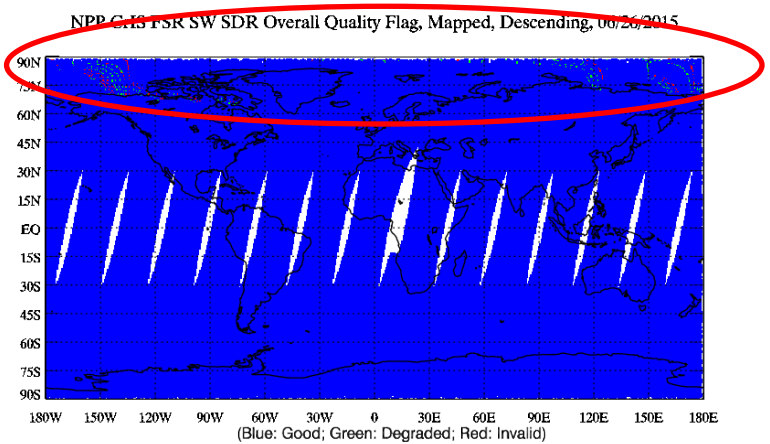
Application: lunar intrusion bug



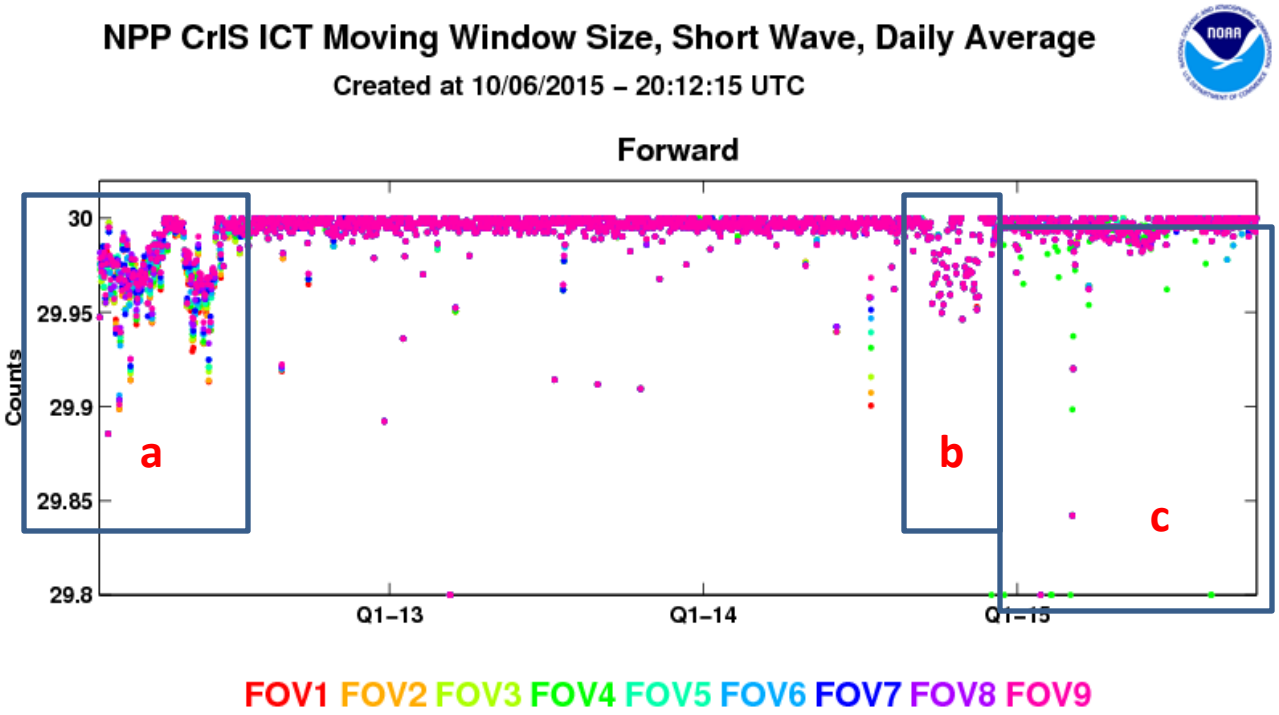


FOV5 NEDN, Reverse direction, Jun-26-2015





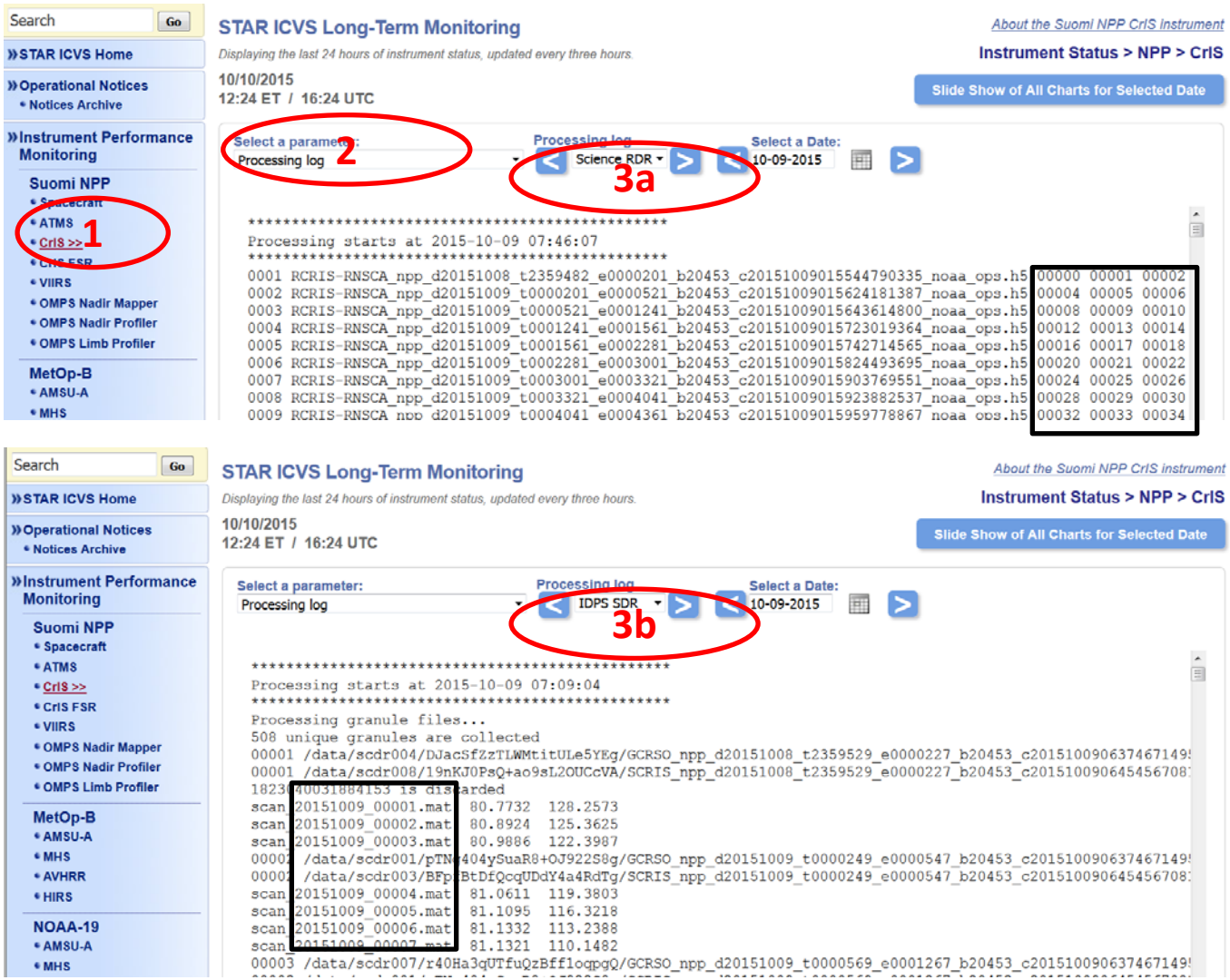
Application: ground system performance



Calibration window size is a good indicator for ground processing system behavior, drop of calibration window size indicates the incompleteness of science RDR data:

a) Minimal percentage of received RDR packets for processing is set too low
b) Re-tasking procedure failed
c) Contamination of Direct Broad (DB) data stream. Packets of FOV4 and 6 are dropped in DB data steam for data rate concern

Application: data indexing and querying



http://www.star.nesdis.noaa.gov/icvs/metrics/status/NPP/CrIS_text/${yyyy}/${mm}/${yyyymmdd}_**rcris**_icvs_log.txt

http://www.star.nesdis.noaa.gov/icvs/metrics/status/NPP/CrIS_text/${yyyy}/${mm}/${yyyymmdd}_**scris**_icvs_log.txt

Application: spacecraft maneuver

1

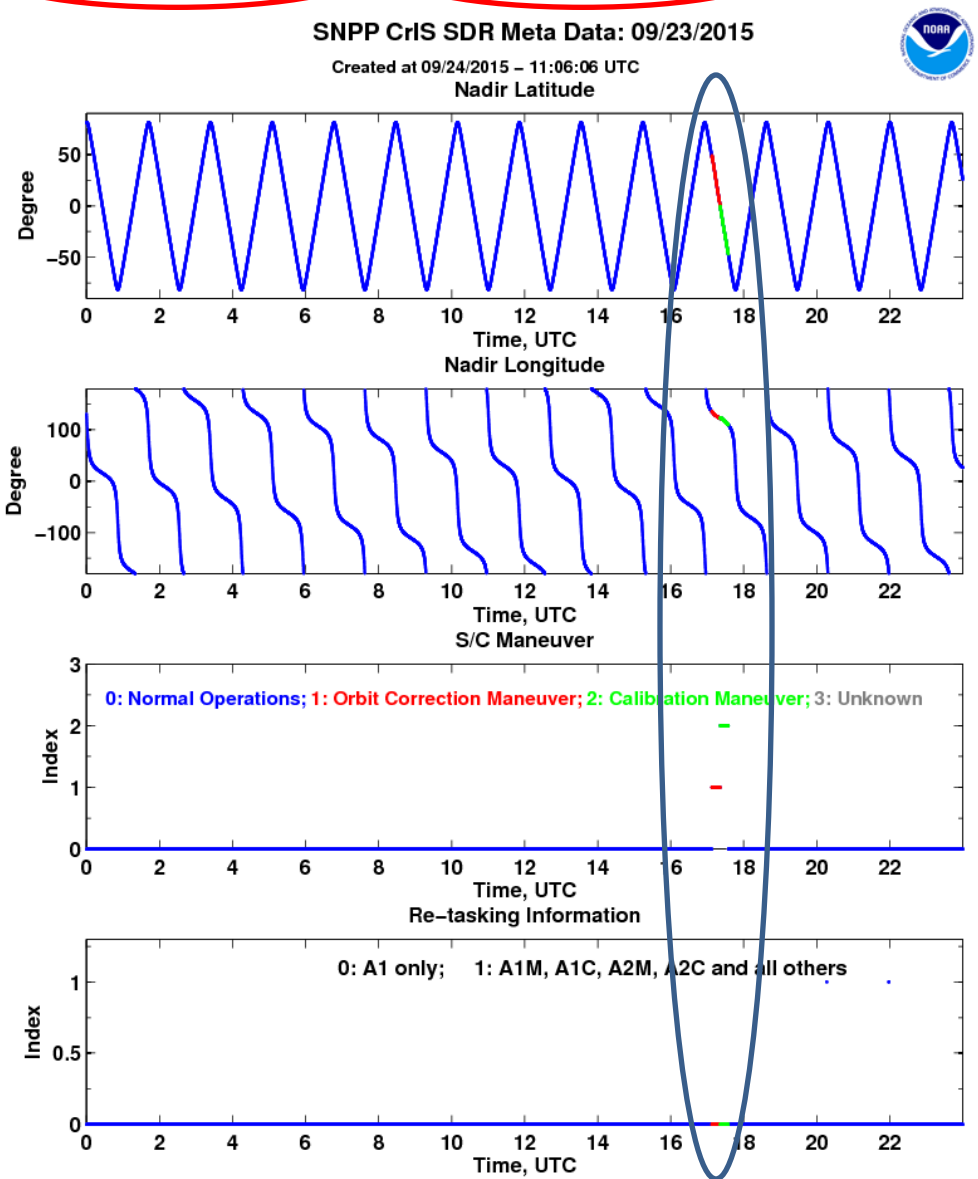
Select a parameter: Collection of Critical Variables

2

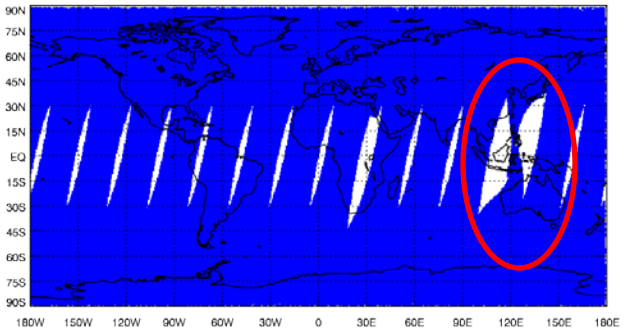
Collection of Critical Variables: SDR Meta: Orbit Maneuver and Version

3

Select a Date: 09-23-2015

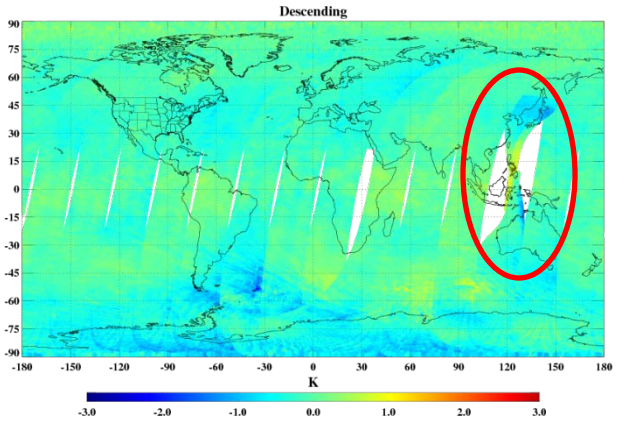


NPP CrIS Long Wave SDR Overall Quality Flag, Mapped, Descending, 09/23/2015



(Blue: Good; Green: Degraded; Red: Invalid)

SNPP CrIS BT Obs. - CRTM Sim., 14.93μm (670cm^{-1}), 2015-09-23



Conclusions

- The ICVS-CrIS is a powerful tool for NOAA operational hyperspectral satellite data monitoring and quality analysis

- Users are encouraged to search useful information on its website for their own works.

- Your suggestions and feedbacks are greatly appreciated and are critical for us to make improvements in the future.